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DIALOG(R)File 351:Derwent WPI

009629435 **Image available**
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Coating thickness measuring instrument - has measuring head incorporating memory storing table of values corresp. to series of measurements taken

Patent Assignee: ELCOMETER INSTR LTD (ELCO-N)
Number of Countries: 002 Number of Patents: 002
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
GB 2265985	A	19931013	GB 937270	A	19930407	199341	B
DE 4311614	A1	19931014	DE 4311614	A	19930408	199342	

Priority Applications (No Type Date): GB 928190 A 19920411
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
GB 2265985	A		12	G01D-018/00	
DE 4311614	A1		4	G01D-003/02	

Abstract (Basic): GB 2265985 A

The measuring instrument comprises a host data processor (1) and a pod (2). The host data processor may include a micro-controller unit (4), operator key panel (5), display (6), program memory (7) and data memory (8). The pod may include a probe (10), a micro-controller unit (11), program memory (12), calibration memory and linearisation look-up tables (13), an analogue to digital convertor (14) and analogue section (15).

The pod (2) may be plugged into the host data processor which provides the necessary power and communications for the pod.

ADVANTAGE - Provision of look-up tables in pod means that those tablets can be tailored to particular probe, which considerably enhances accuracy of instrument, i.e. each probe can carry its own calibration adjustment data.

Dwg.1/1

Title Terms: COATING; THICK; MEASURE; INSTRUMENT; MEASURE; HEAD; INCORPORATE; MEMORY; STORAGE; TABLE; VALUE; CORRESPOND; SERIES; MEASURE
Derwent Class: S02; T01
International Patent Class (Main): G01D-003/02; G01D-018/00
International Patent Class (Additional): G01B-007/10; G01B-021/08; G06F-015/46
File Segment: EPI
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(51) INT CL[5]
G01D 18/00, G01B 7/10

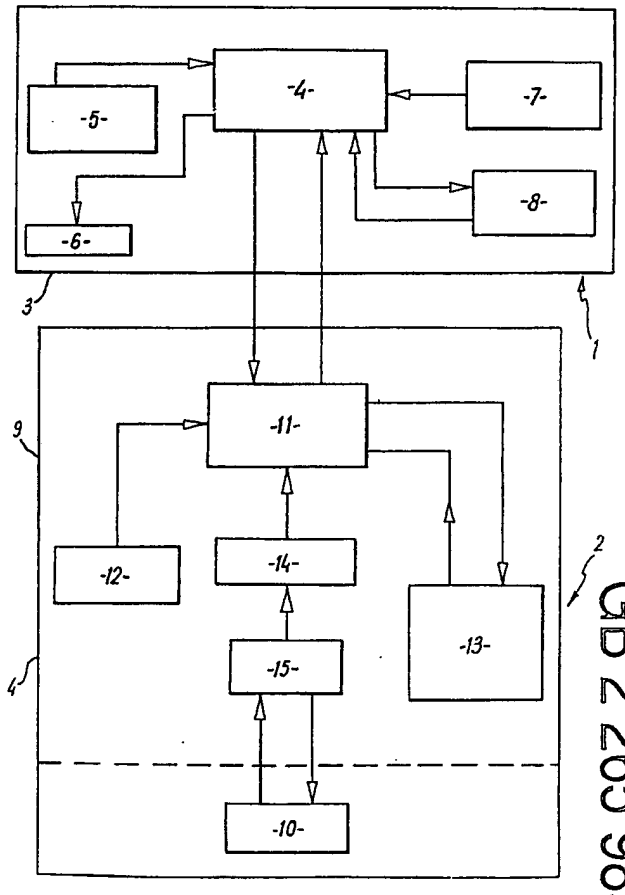
(52) UK CL (Edition L)
G1N NCTE N19H7B2 N19X1

(56) Documents cited
GB 2249837 A GB 2156526 A GB 2119095 A
GB 2112944 A GB 2085595 A GB 1595682 A
EP 0064218 A2

(58) Field of search
UK CL (Edition L) G1A AFB, G1G GEX, G1N NAHA NCTD NCTE NCTL NCTM
INT CL[5] G01B, G01D
Online database: WPI

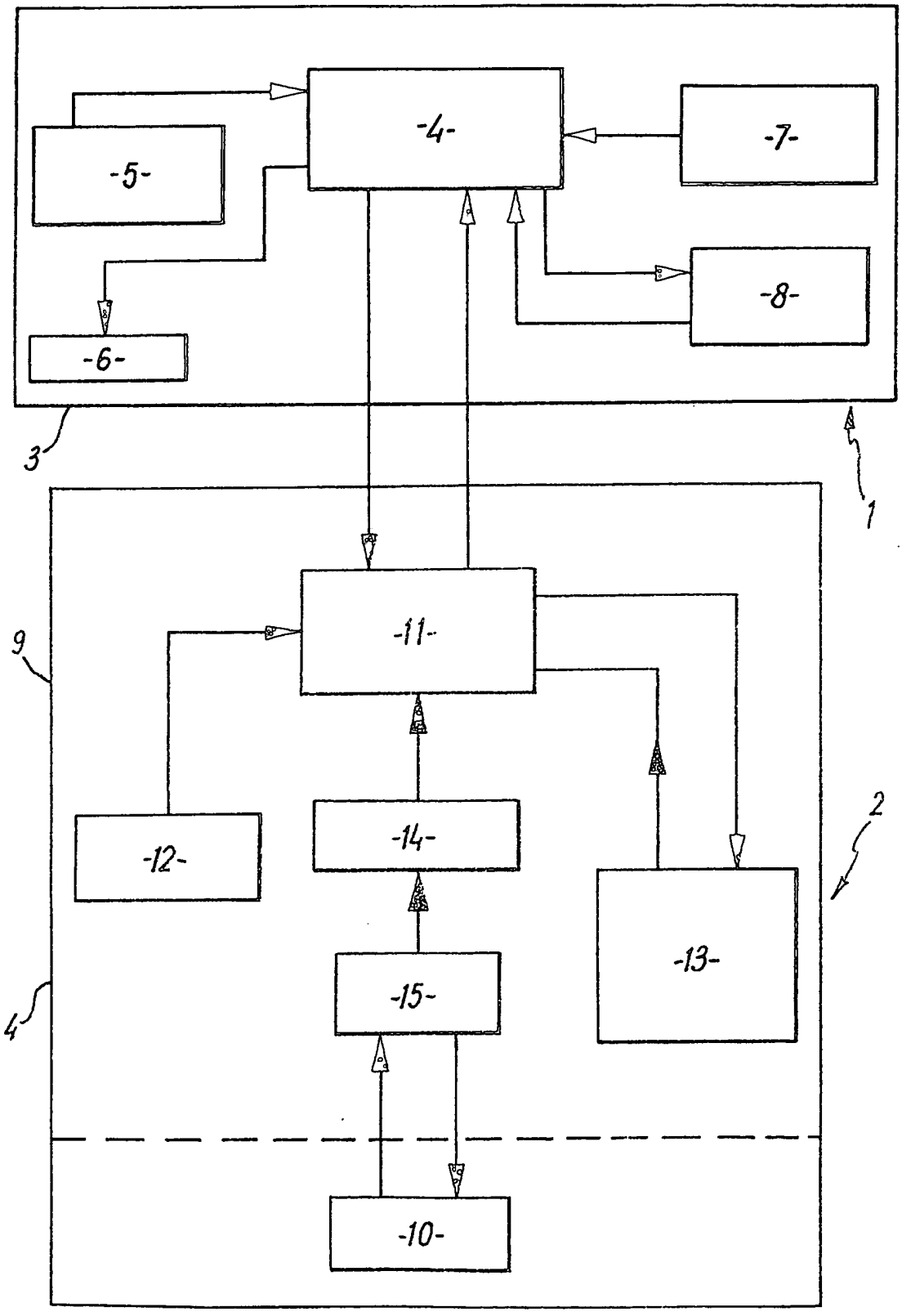
(54) Measuring instrument

(57) A measuring instrument comprises a host data processor 1 and a pod 2. The host data processor may include a microcontroller unit 4, operator key panel 5, display 6, program memory 7 and data memory 8. The pod may include a probe 10, a microcontroller unit 11, program memory 12, calibration memory and linearisation lookup tables 13, analogue to digital convertor 14 and analog section 15. The pod 2 may be plugged into the host data processor which provides the necessary power and communications for the pod. The provision of lookup tables 13 in the pod 2 means that those tables can be tailored to the particular probe 10 which considerably enhances the accuracy of the instrument, i.e. each probe can carry its own calibration adjustment data. The device may be used for measuring coating thickness or used with other pods to measure temperature, humidity, ultrasonics etc.



GB 2 265 985 A

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.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MEASURING INSTRUMENT

The present invention relates to a measuring instrument, particularly, but not exclusively, a measuring instrument for measuring the thickness of a coating on a substrate.

Coating thickness measuring instruments are well known. In one such hand held instrument, an electrical signal is received from an electromagnetic probe held against the coated substrate and processed to give a coating thickness measurement. Digital processing circuitry and analogue measuring elements are integrated together with the battery, display and keyboard in a single enclosure. The probe is either, permanently wired or otherwise attached via an appropriate plug and socket. The coating thickness is measured using an analogue measuring transducer which produces a non-linear output voltage in response to the input thickness. The design of the analogue part is dependent upon the type of substrate on which the measurements are being taken and the specified measuring range of the instrument. Part of the digital processing circuitry is used to deal with the instrument operation such as power regulation, keyboard function, display drive, data storage, statistical analysis and transmission of the thickness values to peripheral equipment.

The rest of the circuitry deals with the analogue element to calculate the thickness values in respect of the analogue response characteristic. The combination of all these elements produce a powerful instrument but one with two important limitations.

However, once an instrument is built it is restricted to taking readings on a particular substrate or coating thickness range. An upgrade to a different specification would require the purchase of a complete new instrument. Also, when a probe wears out or becomes damaged, a replacement will be made to a general specification and unless the instrument is returned to the factory, only an approximate match can be made thus linearity performance will generally be poor.

According to the present invention, there is provided a measuring instrument comprising a measuring head, means associated with the head for producing a signal representing the measurement being taken, said means incorporating a memory storing a table of values corresponding to a series of measurement taken with the head.

In a preferred embodiment of the invention, the measuring instrument comprises a host data processor and

a pod which houses both the head and the memory in which the table of values are stored. The host and pod are arranged to be plugged together. Different pods may therefore be plugged into the same host data processor. The host data processor comprises a microcontroller unit, an operator key panel, display, program memory and data memory. The pod comprises, in addition to the memory holding the table of values known as look up tables and the head, a program memory, analog section and analogue to digital converter. The look-up table memory is advantageously based upon non-volatile read/write devices. The host data processor provides the power and communications for the pod.

In order that the invention may be more clearly understood, one embodiment thereof will now be described, by way of example, with reference to the single figure of the accompanying drawing, which shows a block circuit diagram of a coating thickness measuring instrument according to the invention.

Referring to the drawing, the coating thickness measuring instrument comprises a host data processor 1 and a pod 2. The host data processor 1 comprises a housing 3 in which is disposed a microcontroller unit 4, operator key panel 5, display 6, program memory 7 and data memory 8. The pod 2 comprises a housing 9 in which

is disposed a head in the form of a probe 10 at one end, a microcontroller unit 11, program memory 12, calibration memory and linearisation memory lookup tables 13 analogue to digital convertor 14, and analog section 15.

In the host data processor 1, the microcontroller unit 4 is connected to receive calibration adjustments from the operator key panel 5 and a program from the program memory 7, and to receive data from and supply data to the data memory 8. It is also connected to supply thickness values to the display 6.

In the pod 2, the microcontroller unit 11, is connected to receive a program from program memory 12 and to receive data from and supply data to the calibration memory and linearisation memory look up tables 13. The probe receives from analog section 15 an alternating current signal which is modified by the coated substrate. This modified signal is fed back to the analog section converted to d.c. in the converter 14 and fed to the microcontroller unit 11. The host data processor 1 and pod 2 are connected together through their respective microcontroller units 4 and 11 by virtue of an appropriate plug and socket arrangement. The host data processor 1 provides the necessary power and communications for the pod 2 via this connection.

In operation of the instrument, microcontroller unit 11 produces a thickness value which is fed to microcontroller unit 4. This value is produced in unit 11 by interpolating between steps of the look up table in memory 13 under the control of the program in memory 12, the steps being chosen in dependence upon the signal received from the probe 10 processed by section 15, converter 14 and unit 11. Microcontroller unit 4 displays this thickness value on display 6 under the control of memories 7 and 8.

When the above described instrument is manufactured, the linearisation memory (look up tables) can be uniquely matched during manufacture to the probe both of which form parts of one and the same pod. Since because of, inter alia, manufacturing tolerances, no two probes are alike this facility increases the accuracy of the instrument. By comparison in prior art arrangements all the probes of a batch would be calibrated and the average of that batch calibration stored in the look up tables. By accepting the average a certain degree of inaccuracy albeit small for certain of the probes was also accepted. Placing the probe in the same pod with its own unique lookup table means that if an end user wishes to replace a worn or damaged pod after original manufacture, the probe in the replacement pod can also be matched to its own lookup table. Furthermore, by having one host data

processor and a selection of pods, the end user can have comprehensive measuring capacity much more economically than he could with a range of conventional instruments. Also the host data processor need not be limited to coating thickness measuring, but could also be used with pods for temperature, humidity, ultrasonics etc.

It will be appreciated that the above embodiment has been described by way of example only and that many variations are possible without departing from the scope of the invention.

CLAIMS

1. A measuring instrument comprising a measuring head, means associated with the head for producing a signal representing the measurement being taken, said means incorporating a memory storing a table of values corresponding to a series of measurement taken with the head.

2. A measuring instrument as claimed in claim 1, comprising a host data processor and a pod, the head and memory being housed in the pod.

3. A measuring instrument as claimed in claim 2, in which the host and pod are arranged to be plugged together.

4. A measuring instrument as claimed in claim 2 or 3, in which the host data processor comprises a microcontroller unit, an operator key panel display means, program memory and data memory, the microcontroller being operative to receive calibration adjustments from the operator by panel and a program from the program memory and to receive data from and supply data to the data memory.

5. A measuring instrument as claimed in claim 2,3 or 4, in which the host data processor provides power and

communications for the pod.

6. A measuring instrument as claimed in any preceding claim, in which the look-up table memory is a non-volatile read/write device.

7. A measuring instrument as claimed in any preceding claim, which is a coating thickness measuring instrument.

8. A measuring instrument as claimed in any preceding claim, in which the pod comprises a microcontroller, program memory and analogue to digital convertor, the microcontroller unit being connected to receive data from and supply data to the lookup tables.

9. A measuring instrument substantially as hereinbefore described with reference to the accompanying drawings.

Patents Act 1977
Examiner's report to the Comptroller under Section 17 (The Search Report)

Application number
GB 9307270.0

Relevant Technical fields

(i) UK Cl (Edition L) G1N (NAHA, NCTE, NCTD, NCTL, NCTM); G1A (AFB); G1G (GEX)

(ii) Int Cl (Edition 5) G01B G01D

Search Examiner
D J HARRIS

Databases (see over)

(i) UK Patent Office

(ii) ONLINE DATABASE: WPI

Date of Search
1 JULY 1993

Documents considered relevant following a search in respect of claims 1-9

Category (see over)	Identity of document and relevant passages		Relevant to claim(s)
X	GB 2249837 A	(NEWPORT ELECTRONICS) - whole document	1, 6
X &	GB 2156526 A US 4695797	(KARL DEUTSCH) - whole document see especially page 3 lines 63-86	1, 7
X	GB 2119095 A	(GOLDCREST) - whole document	1-6, 8
X	GB 2112944 A	(TAYLOR) - whole document	1, 6, 7
X	GB 2085595 A	(TERUMO) - whole document	1, 6
X	GB 1595682 A	(ZUMBACH) - whole document	1, 7
X	EP 0064218 A2	(ROHDE & SCHWARZ) - see especially Figure 1	1-4

Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family, corresponding document.

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).

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